

Claims

- [c1] 1. A hybrid-electric wheeled vehicle powertrain comprising an internal combustion engine, an electric motor, an electric generator and a battery;
the electric motor, the electric generator and the battery being electrically connected to form an electrical power source;
a geared transmission defining power flow paths to vehicle traction wheels, the geared transmission having a first element connected drivably to the engine and a second element connected drivably to the motor;
a rotor for the generator being connected to a third element of the geared transmission;
a first reaction brake for anchoring the first element of the geared transmission as the engine drives the electric generator during operation of the powertrain in a forward driving power delivery mode, the electric motor being drivably connected through the geared transmission to the vehicle wheels;
a clutch between the second element of the geared transmission and a torque output element of the geared transmission whereby the motor, with the clutch disengaged, is isolated from the second element during re-

verse drive; and

a second reaction brake 60 for anchoring the second element of the geared transmission as the engine drives the torque output element of the geared transmission with the clutch engaged during operation of the powertrain in a split-power delivery mode in a forward driving direction.

- [c2] 2. A hybrid-electric wheeled vehicle powertrain comprising an internal combustion engine, an electric motor, an electric generator and a battery;
the electric motor, the electric generator and the battery being electrically connected to form an electrical power source;
a geared transmission defining power flow paths to vehicle traction wheels, the geared transmission having a first element connected drivably to the engine and a second element connected drivably to the vehicle traction wheels;
a rotor for the generator being connected to a third element of the geared transmission;
a reaction brake for anchoring the first element of the geared transmission as the engine drives the electric generator during operation of the powertrain in a forward driving direction and as the electric motor is drivably coupled through the geared transmission to the ve-

hicle wheels; and

a clutch between the electric motor and the gear elements of the geared transmission, the clutch being disengaged during reverse drive operation whereby the engine drives the generator to charge the battery through a torque flow path that is isolated by the clutch from a reverse drive torque flow path.

[c3] 3. The hybrid-electric wheeled vehicle powertrain set forth in claim 2 wherein the geared transmission includes a second clutch connecting two gear elements of the geared transmission to achieve a direct drive ratio in a torque delivery path between the engine and the generator as the engine drives the generator to charge the battery.

[c4] 4. The hybrid-electric wheeled vehicle powertrain set forth in claim 1 wherein the geared transmission has a planetary gear set including a sun gear connected to the generator, a ring gear and a carrier connected to the engine;
the clutch, when engaged, completing a geared torque flow path between the engine and the vehicle traction wheels during forward drive operation,
the first reaction brake anchoring the carrier when the generator is driven by the engine in forward drive operation.

- [c5] 5. The hybrid-electric wheeled vehicle powertrain set forth in claim 2 wherein the geared transmission has a planetary gear set including a sun gear connected to the generator and a carrier connected to the engine; the clutch completing a torque flow path between the ring gear and the vehicle traction wheels during forward drive operation.
- [c6] 6. The hybrid-electric wheeled vehicle powertrain set forth in claim 1 wherein the second reaction brake acts on the second element of the geared transmission to effect engine starting torque delivery from the generator to the engine as the generator functions as an engine starter torque source.
- [c7] 7. The hybrid-electric wheeled vehicle powertrain set forth in claim 4 wherein the second reaction brake anchors the ring gear of the geared transmission to effect engine starter torque delivery from the generator to the engine as the generator functions as an engine starter torque source.
- [c8] 8. The hybrid-electric wheeled vehicle powertrain set forth in claim 5 wherein the geared transmission includes a second clutch connecting two gear elements of the geared transmission to achieve a direct drive ratio in

a torque delivery path between the engine and the generator as the engine drives the generator to charge the battery.